6.3 Compliance of Alternatives with Regulatory Requirements

This section identifies the permits, licenses, and approvals that apply to the different alternatives being evaluated. Section 6.3.1 identifies which alternatives require RCRA, air, water, Nuclear Regulatory Commission, and/or U.S. Department of Transportation permits, licenses, or approvals, and also lists the delisting and "determination of equivalent treatment" approvals required. Significant issues related to regulatory requirements are discussed in Section 6.3.2. Section 6.3.3 provides a discussion of the specific issues involved with each alternative.

6.3.1 PERMITS, LICENSES, AND/OR APPROVALS REQUIRED FOR EACH ALTERNATIVE

Examples of waste processing facilities that would require permits, licenses, and/or approvals are listed in Table 6-3. These facilities include existing facilities that would require permits, licenses, and/or approvals to continue to operate, or new facilities that would require permits, licenses, and/or approvals to commence construction and to operate once they are constructed. Table 6-4 summarizes which RCRA, air, water, Nuclear Regulatory Commission, and U.S. Department of Transportation permits, licenses, or approvals would be required for each alternative. Table 6-5 lists the Federal permits, licenses, and other entitlements that may be required to implement the proposed actions. The permitting requirements are described in a general manner. For example, the designation of "solid and hazardous waste" would encompass any permitting requirements under RCRA, or any state solid or hazardous waste permitting requirements. "Air" would encompass any permitting requirements under the Clean Air Act or state equivalent and would also include any approvals needed to be obtained, such as approvals required under the National Emissions Standards for Hazardous Air Pollutants. Finally, "water" would encompass any permitting requirements under the Clean Water Act and related programs, including National Pollutant Discharge Elimination System permits in general and for stormwater discharge, wastewater applications permits (specific to the State of Idaho), and any approvals required under the Safe Drinking Water Act.

6.3.2 ISSUES AND IMPLICATIONS OF REGULATORY REQUIREMENTS

The previous sections have identified the requirements for permits and licenses associated with the various alternatives as well as the current assumptions under which the program is proceeding. There is uncertainty regarding the ability of DOE to reach agreement with the regulatory agencies on many of these issues. The consequences of not being able to develop a regulatory framework upon which all parties can agree may have serious implications. This section discusses some of those implications.

6.3.2.1 Delisting

As described in Section 6.2.5, delisting is EPA's designated method to exclude listed hazardous waste from regulation under RCRA. Because the treated forms of the INTEC wastes that would be the subject of the delisting do not currently exist, DOE would seek the type of delisting known as an "upfront" exclusion. This is a special type of conditional exclusion that could be granted for a waste that has not yet been generated.

The INTEC waste streams are a combination of characteristic (e.g., corrosive or toxic) and listed hazardous wastes that are regulated under RCRA. Without delisting, the treated waste forms produced from these materials under the various alternatives in this EIS would continue to be regulated as mixed wastes under RCRA even if the applicable land disposal restrictions were met. INEEL presently has no mixed waste disposal capacity. Some offsite low-level mixed waste disposal capacity is available but it is limited by the radiological characteristics of the wastes that may be disposed of. Capacity for mixed transuranic waste exists at the Waste Isolation Pilot Plant, although not all types of hazardous wastes in the INTEC mixed waste

Table 6-3. Examples of facilities that may require permits, licenses, and/or approvals.

Existing facilities	Description
Tank Farm	The Tank Farm stores mixed transuranic waste (SBW and newly generated liquid waste).
New Waste Calcining Facility (NWCF)	The calciner at the NWCF was developed to convert liquid waste solutions stored in the Tank Farm into a more stable granular form called calcine. The waste solution is evaporated in a fluidized bed calciner and the off-gas produced passes through a cyclone, an offgas cleanup system, and HEPA filters before it is discharged to the main stack.
Calcined Solids Storage Facilities (bin sets)	After calcination, the calcine and the fines particles collected by the cyclone are pneumatically transferred to the bin sets for storage. Air circulates through the bin sets to remove heat that is generated by the radionuclides present in the calcine.
High-Level Liquid Waste Evaporator (HLLWE)	The HLLWE concentrates solutions currently stored in the Tank Farm. The HLLWE concentrates the waste solutions to a specific gravity that approaches the design basis of the Tank Farm. The vapors generated are condensed for further processing in the PEWE. The concentrated bottoms are transferred back to the Tank Farm for storage.
Process Equipment Waste Evaporator (PEWE)	The PEWE concentrates the mixed transuranic newly generated liquid waste. The PEWE bottoms are transferred to the Tank Farm for storage and the overhead vapors condensed for processing at the LET&D Facility.
Liquid Effluent Treatment and Disposal (LET&D) Facility	The LET&D Facility is used to concentrate the nitric acid in the waste solutions. The concentrated acid is recycled to the NWCF for use as scrub solution or sent to the Tank Farm for storage. The process offgas is filtered and discharged at the main stack.
Proposed facilities	**Description**
Vitrification Facility (two types)	The vitrification process would combine the waste stream with glass formers for processing in a glass melter. Vitrification facilities would be used under the Full Separations Option (separated high-level waste fraction) and Early Vitrification Option [mixed transuranic waste/SBW and calcine treated separately].
Hot Isostatic Press Facility	In the Hot Isostatic Pressed Waste Option, silicates and titanium or aluminum powder would be blended with retrieved calcine, placed in special HIP cans, and subjected to high pressure and temperature to form a glass-ceramic product.
Cementation Facility	The Direct Cement Waste Option would involve blending calcine with pozzolan clay, blast furnace slag, caustic soda, and water. The mixture would be placed in stainless steel canisters, cured at elevated temperatures, and then heated under vacuum to produce a cement waste form.
Grout Facility (two types)	The grout facility would evaporate and denitrate the low-level waste fraction to produce low-level Class A or C type grout. The grout formed in the Full Separations and Planning Basis Options would be considered Class A type, while the grout formed in the Transuranic Separations Option would be classified as Class C type due to higher concentrations of radioactivity.
Calcine Retrieval and Transport System	The Calcine Retrieval and Transport System would retrieve the calcine from the bin sets. After retrieval, the calcine would be transported to another bin set (e.g., transfer from bin set 1 to bin set 6 or 7 under No Action and Continued Current Operations Alternatives) or to other facilities to be further processed.
Waste Separations Facility (two types)	This facility would receive mixed transuranic waste/SBW from the Tank Farm and mixed HLW calcine from the bin sets. After some initial treatment of these feed streams, the radionuclides would be chemically separated into two streams, the high-level waste fraction or transuranic fraction would contain the transuranic nuclides, cesium, and strontium. The low-level waste fraction would contain the rest of the nuclides. Under the Transuranic Separations Option, the cesium and strontium would not be separated and would remain in the low-level waste fraction.

Table 6-3. (continued).

Existing facilities	Description
Interim Storage Facility	This facility provides interim storage for road-ready HLW until shipment to a geologic repository.
Low-Activity Waste Disposal Facility	This facility receives containerized low-level waste Class A or Class C type grout for disposal.

HEPA = High Efficiency Particulate Air.

streams have been identified on the Waste Isolation Pilot Plant hazardous waste permit. The candidate geologic repository at Yucca Mountain does not plan to accept RCRA-regulated hazardous wastes. Therefore, DOE may need to obtain a "delisting" to exclude treated INEEL waste from RCRA regulation in order to implement the selected action. There are uncertainties associated with DOE's ability to delist the wastes produced from mixed HLW and mixed transuranic waste/SBW treatment. Among these uncertainties are:

- Delisting action will require a comprehensive evaluation of waste characteristics, most likely including analytical results of representative samples of the wastes to be delisted. The information likely to be required by the regulatory agencies is beyond that which is currently available. At a minimum, testing of the inputs and outputs of the treatment process will be required. Because of the current storage configuration of the waste in the bin sets and Tank Farm, it will be difficult to obtain representative samples of the waste forms. This is complicated by the presence of very high radiation levels associated with the waste, which make it very difficult to obtain the samples or perform the required analysis.

- Delisting actions are normally based, at least partially, on the results of treatability studies. These studies provide the information to demonstrate that the proposed treatment processes are actually capable of producing a waste form that could be considered non-hazardous. The technological maturity of some of the proposed treatment processes, and the level of their development is immature, and it will be some time in the future before such treatability studies could be conducted. Without data from such studies, it is uncertain that the regulatory agencies will commit to a delisting strategy.

- Delisting actions normally require some sort of verification testing of the final waste forms. Even if treatability studies show that adequate treatment is possible, testing of the final waste form will be required. As a result, DOE will not be sure that the proposed processes are capable of supporting a delisting until they have been proven in a full-scale production environment.

- The delisting process would take place in a complex regulatory environment. Two EPA regional offices and authorized states all have authority to act on a delisting petition, although a state's decision applies only within its borders and cannot improperly interfere with interstate commerce. Therefore, coordination and consultation with a number of states and EPA regional offices would be required prior to waste shipment for disposal. In addition, each listed waste stream will have its own delisting action, requiring multiple petitions and determinations.

Alternate approaches available to DOE to address the listed waste issue in lieu of delisting include: (1) development of alternative strategies, under initiatives such as EPA's Project XL, that would replace or modify regulatory require-

Table 6-4. Air, water, NRC, DOT, and RCRA permits, licenses, or approvals required for each alternative.

Permit, license, and/or approval type	No Action Alternative	Continued Current Operations Alternative	Separations Alternative: Full Separations Option	Separations Alternative: Planning Basis Option	Separations Alternative: Transuranic Separations Option	Non-Separations Alternative: Hot Isostatic Pressed Waste Option	Non-Separations Alternative: Direct Cement Waste Option	Non-Separations Alternative: Early Vitrification Option	Minimum INEEL Processing Alternative
Air									
Permit to construct	–[a]	●[b]	●	●	●	●	●	●	●
Title V Operating	–	●	●	●	●	●	●	●	●
Maximum Achievable Control Technology[c]	–	●	–	●	–	●	●	–	–
Water									
National Pollutant Discharge Elimination System	–	–	●	●	●	●	●	●	●
U.S. Nuclear Regulatory Commission									
Incidental Waste Consultation	–	●	●	●	●	●	●	●	●
Container License	–	●	●	●	●	●	●	●	●
U.S. Department of Transportation									
Transportation	–	●	●	●	●	●	●	●	●
Resource Conservation and Recovery Act Part B									
Treatment	–	●	●	●	●	●	●	●	●
Storage	[d]	●	●	●	●	●	●	●	●
Disposal	–	–	–	–	–	–	–	–	–
Resource Conservation and Recovery Act approval									
Delisting	–	●	●	●	●	●	●	●	●
Determination of Equivalent Treatment	–	–	–	–	–	●	●	–	–

a. Dash indicates that no permit/license/approval is required.
b. ● indicates that a permit/license/approval is required.
c. These entries indicate that the Maximum Achievable Control Technology Rule for hazardous waste combustors would be applicable to calciner operations under these alternatives and options.
d. Future RCRA permit requirements for the Tank Farm and bin sets are uncertain.

Table 6-5. Facility-specific list of permits, licenses, and approvals that may be required.

Facility	Hazardous waste	Air	Water
Tank Farm	●[a]	–[b]	–
New Waste Calcining Facility	●	●	–
Calcined Solids Storage Facilities (bin sets)	●	●	–
High-Level Liquid Waste Evaporator	●	●	–
Process Equipment Waste Evaporator	●	●	–
Liquid Effluent Treatment and Disposal Facility	●	●	–
Vitrification Facility (two types)	●	●	–
Hot Isostatic Press Facility	●	●	–
Cementation Facility	●	●	–
Grout Facility (two types)	●	●	–
Calcine Retrieval and Transport System	●	●	–
Waste Separations Facility (two types)	●	●	–
Interim Storage Facility	–	–	–
Low-Activity Waste Disposal Facility	–	●	–

a. ● indicates that a permit/license/approval is required.
b. Dash indicates that no permit/license/approval is required.

ments on the condition that the alternative requirements produce greater environmental benefits and (2) exclusion by Congressional amendment.

President Clinton created Project XL, which stands for "eXcellence and Leadership," with his March 15, 1995, Reinventing Environmental Regulation initiative. This program is designed to give regulated sources the flexibility to develop alternative strategies that will replace or modify specific regulatory requirements, on the condition that they produce greater environmental benefits. A successful proposal will develop alternative pollution reduction strategies that meet eight criteria: better environmental results; cost savings and paperwork reduction; stakeholder support; test of an innovative strategy; transferability; feasibility; identification of monitoring, reporting, and evaluation methods; and avoidance of shifting risk burden. The ability for DOE to meet the requirements of an XL proposal are uncertain at this time. A Congressional Amendment could occur if Congress determined that methods employed to treat waste destined for a geologic repository and the design of the repository were adequate to protect human health and the environment without further regulation under RCRA. The likelihood of that kind of congressional action is also uncertain, but a similar, albeit limited, action has occurred for the Waste Isolation Pilot Plant.

There are several implications of the failure to achieve a determination that treated waste forms are no longer subject to RCRA. Long-term RCRA-compliant storage will be required for those waste forms for which delisting is not granted. The cost of both building and operating RCRA-compliant storage facilities is higher than for non-regulated units. Worker radiation exposures could be higher due to increased inspection requirements. Most significantly, without delisting no disposal site has been identified for the final HLW form. Current plans for the proposed Yucca Mountain repository exclude RCRA-regulated hazardous wastes. This implies that the treated HLW would remain in Idaho until a repository or storage site meeting RCRA requirements becomes available.

6.3.2.2 Waste Incidental to Reprocessing

The terms "incidental waste" or "waste incidental to reprocessing" refer to a process for identifying waste streams that might otherwise be considered HLW due to their origin, but are actually low-level or transuranic waste, if the waste incidental to reprocessing requirements contained in DOE Manual 435.1-1 are met (DOE 1999a). Thus, it is a process by which the DOE can make a determination that, for example, waste residues remaining in HLW tanks, equipment, or transfer lines, are managed as low-level or transuranic waste if the requirements in Section II.B of DOE Manual 435.1-1 have been or will be met. The requirements contained in this section of DOE Manual 435.1-1 are divided into two processes, the "citation" process and the "evaluation" process, and are explained further in the following discussion.

Waste resulting from processing spent nuclear fuel that is determined to be incidental to reprocessing is not HLW, and shall be managed under DOE's regulatory authority in accordance with the requirements for transuranic waste or low-level waste, as appropriate. When determining whether spent nuclear fuel processing plant wastes are another waste type or as HLW, either the citation or evaluation process described below shall be used.

Citation – Waste incidental to reprocessing by citation includes spent nuclear fuel reprocessing plant wastes that meet the "incidental waste" description included in the Notice of Proposed Rulemaking (34 FR 8712; June 3, 1969) for pro-

mulgation of proposed Appendix D, 10 CFR Part 50, Paragraphs 6 and 7. These radioactive wastes are the result of processing plant operations. Examples of wastes that have been determined to be included within the citation process are:

- Contaminated "job wastes," a general category of wastes that are generated during HLW transfer, pretreatment, treatment, storage and disposal activities and includes protective clothing, personnel protective equipment, work tools, ventilation filter media, and other job-related materials necessary to complete HLW management activities
- Sample media (e.g., sampling vials, crucibles, other hardware)
- Decontamination media and decontamination solutions (e.g., swabs, other "decon" work-related materials)
- Laboratory clothing, tools, and equipment.

Those waste that have been interpreted to be excluded from the citation process are:

- Ion exchange beds
- Sludges
- Process filter media
- Contaminated components and equipment.

The authority and responsibility for using the citation process resides with the Field Element Manager at the DOE Field or Operations Office. Consultation and coordination with the DOE Office of Environmental Management is encouraged to support consistent interpretations across the DOE complex, but is not required.

Evaluation – Determinations that any waste is incidental to reprocessing by the evaluation process shall be developed under good record-keeping practices, with an adequate quality assurance process, and shall be documented to support the determinations. Such wastes may include, but are not limited to, spent nuclear fuel reprocessing plant wastes that:

(a) Will be managed as low-level waste and meet the following criteria:

(1) Have been processed, or will be processed, to remove key radionuclides to the maximum extent that is technically and economically practical. Although not formally defined; it is generally understood that "key radionuclides" applies to those radionuclides that are controlled by concentration limits in 10 CFR 61.55. A technically practical process must be evaluated to a sufficient degree through a formal, documented assessment of such factors as technical risk, incompatible physical or chemical requirements with the waste, and potential impacts to the public, the worker, and the environment. The "economically practical" part of the requirement is determined by the development of total life-cycle costs for an alternative, or unit costs, (e.g., cost per curie removed).

(2) Will be managed to meet safety requirements comparable to the performance objectives set out in 10 CFR Part 61, Subpart C, "Performance Objectives." An assessment will need to be prepared that documents a reasonable expectation that DOE Manual 435.1-1, Chapter IV, low-level waste performance objectives, will be met.

(3) Are to be managed, pursuant to DOE's authority under the Atomic Energy Act of 1954, as amended, and in accordance with provisions of Chapter IV of DOE Manual 435.1-1, provided the waste will be incorporated in a solid physical form at a concentration that does not exceed the applicable concentration limits for Class C low-level waste set out in 10 CFR 61.55, "Waste Classification" or will meet alternative requirements for waste classification and characterization as DOE may authorize. DOE will need to demonstrate that the calculated concentration of major radionuclides

expected in the treated waste will not exceed the limits in 10 CFR 61.55, or an analysis that provides reasonable expectation that compliance with DOE Manual 435.1-1, Chapter IV, performance objectives can be achieved.

(b) Will be managed as transuranic waste and meet the following criteria:

(1) Have been processed, or will be processed, to remove key radionuclides to the maximum extent that is technically and economically practical. The process for meeting this requirement is the same as described for low-level waste management in (a)(1) above.

(2) Will meet alternative requirements for waste classification and characteristics, as DOE may authorize. The DOE Field Element would request that the DOE Office of Environmental Management accept, on a case by case basis, the designation of a waste stream as transuranic. DOE Headquarters shall be consulted and an analysis submitted for review and acceptance that provides reasonable assurance that after the evaluation of the specific characteristics of the waste, disposal site characteristics, and method of disposal, compliance with the 40 CFR 191 performance objectives measures can be achieved.

(3) Are managed pursuant to DOE's authority under the Atomic Energy Act of 1954, as amended, in accordance with the provisions of Chapter III of DOE Manual 435.1-1, as appropriate. This will require the preparation of a performance assessment that provides reasonable expectation that the performance objective measures of 40 CFR 191 can be achieved. When using the Evaluation Process, the Field Office Element is required to consult and coordinate with the DOE Office of Environmental Management. Consultation with the Nuclear Regulatory Commission is also strongly encouraged.

In developing the waste processing alternatives, DOE made assumptions regarding the radioactive waste classification of the input waste streams, HLW calcine and mixed transuranic waste (SBW and newly generated liquid waste), and the output waste streams (e.g., HLW, transuranic waste, low-level waste Class A or Class C type grout). DOE will classify all wastes in accordance with the processes in DOE Manual 435.1-1 as described above.

6.3.2.3 Hazardous Waste Codes Applicable to INEEL's HLW & SBW

Currently, the mixed HLW and mixed transuranic waste/SBW at INTEC are being evaluated to determine precisely what hazardous waste codes are applicable to these wastes. That evaluation will be critical to determine whether the transuranic waste streams meet the waste acceptance criteria at the Waste Isolation Pilot Plant because some of the waste codes on the current RCRA Part A application for the INTEC HLW systems are not acceptable for disposal at the Waste Isolation Pilot Plant.

The INEEL mixed HLW is also characterized by more waste codes than those encompassed by the vitrification treatment standard for HLW. Multiple treatment technologies may be associated with these additional codes, and it would be impractical to treat INEEL waste using all of the specified methods. For those waste codes that are not eliminated after further evaluation, DOE would need to seek a determination of equivalent treatment under 40 CFR 268.42(b) to demonstrate that a proposed treatment process provides adequate treatment for all hazardous constituents contained in the waste. In order to accomplish this, DOE would need to demonstrate that the proposed treatment provides a measure of performance equivalent to the land disposal restrictions standard. If radiological exposure risk considerations indicate that it is impractical to perform the required sampling and analysis, DOE could pursue one of two options:

- Establish operating limits over which the technology has been demonstrated to achieve the required concentration lev-

els for hazardous constituents. These operating limits could be determined using nonradioactive surrogates to minimize radiological exposures. All waste produced under these operating conditions would be considered to achieve the required performance.

- Establish alternate test methods that reduce radiological exposure from that associated with conventional sampling and analysis techniques.

6.3.2.4 Repository Capacity and Waste Acceptance Criteria

The Nuclear Waste Policy Act limited the amount of spent nuclear fuel and HLW that could be placed in the Nation's first geologic repository until a second repository would become operational. At the time, the projected inventory of spent nuclear fuel that would require disposal was approximately 140,000 metric tons of heavy metal (MTHM). The limitation was meant to provide "regional equity" among potential repository sites. When the Nuclear Waste Policy Act was amended in 1987, it authorized DOE to characterize only one candidate site and required DOE to terminate all activities on a potential second repository. In this regard, DOE was directed to report to Congress no sooner than January 2007 on the need for a second repository. However, the statutory limit of 70,000 MTHM on first repository emplacement was never revised. Estimates of the amount of spent nuclear fuel that will require geologic disposal are less now, perhaps as little as 86,000 MTHM. This inventory, plus additional quantities of DOE-owned and managed spent nuclear fuel and HLW, clearly exceeds the statutory limit on emplacement in the first repository.

For planning purposes, DOE would emplace 10,000 to 11,000 waste packages containing no more than 70,000 MTHM of spent nuclear fuel and HLW in the repository. Of that amount, 63,000 MTHM would be spent nuclear fuel assemblies that would be shipped from commercial sites to the repository. The remaining 7,000 MTHM would consist of about 2,333 MTHM of DOE spent nuclear fuel and HLW currently estimated to be approximately 8,315 canisters (the equivalent of 4,667 MTHM) that DOE would ship to the repository (DOE 1999b). To determine the number of canisters of HLW included in the waste inventory, DOE used 0.5 MTHM per canister of defense HLW. DOE has used the 0.5 MTHM per canister approach since 1985. In 1985, DOE published a report in response to Section 8 of the Nuclear Waste Policy Act (of 1982) that required the Secretary of Energy to recommend to the President whether defense HLW should be disposed of in a geologic repository along with commercial spent nuclear fuel. That report, *An Evaluation of Commercial Repository Capacity for the Disposal of Defense High-Level Waste* (DOE 1985) provided the basis, in part, for the President's determination that defense HLW should be disposed of in a geologic repository. Given that determination, DOE decided to allocate 10 percent of the capacity of the first repository for the disposal of DOE spent nuclear fuel (2,333 MTHM) and HLW (4,667 MTHM) (Dreyfus 1995; Lytle 1995).

Calculating the MTHM quantity for spent nuclear fuel is straightforward. It is determined by the actual heavy metal content of the spent fuel. However, an equivalence method for determining the MTHM in defense HLW is necessary because almost all of its heavy metal has been removed. A number of alternative methods for determining MTHM equivalence for HLW have been considered over the years. Four of those methods are described in the following paragraphs.

Historical Method - Table 1-1 of DOE (1985) provided a method to estimate the MTHM equivalence for HLW based on comparing the radioactive (curie) equivalence of commercial HLW and defense HLW. The method relies on the relative curie content of a hypothetical (in the early 1980s) canister of defense HLW from the Savannah River Site, Hanford, or INEEL, and a hypothetical canister of vitrified waste from processing of high-burnup commercial spent nuclear fuel. Based on commercial HLW containing 2.3 MTHM per canister (heavy metal has not been removed from commercial waste) and defense HLW estimated to contain approximately 22 percent of the radioactivity of a canister of commercial HLW, defense HLW was estimated to contain the equivalent of 0.5 MTHM per canister. Since 1985, DOE has used this 0.5 MTHM equivalence per canister of

defense HLW in its consideration of the potential impacts of the disposal of defense HLW, including the analysis presented in the *Draft Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (DOE/EIS-0250D). Less than 50 percent of the total inventory of HLW could be disposed of in the repository within the 4,667 MTHM allocation for HLW. There has been no determination of which waste would be shipped to the repository, or the order of shipments.

Spent Nuclear Fuel Reprocessed Method - Another method of determining MTHM equivalence, based on the quantity of spent nuclear fuel processed, would be to consider the MTHM in the HLW to be the same as the MTHM in the spent nuclear fuel before it was processed. Using this method, less than 5 percent of the total inventory of HLW could be disposed of in the repository within the 4,667 MTHM allocation for HLW.

Total Radioactivity Method - The total radioactivity method, would establish equivalence based on a comparison of radioactivity inventory (curies) of defense HLW to that of a standard MTHM of commercial spent nuclear fuel. For this equivalence method the standard spent nuclear fuel characteristics are based on pressurized-water reactor fuel with uranium-235 enrichment of 3.11 percent and 39.65 gigawatt-days per MTHM burnup. Using this method, 100 percent of the total inventory of HLW could be disposed of in the repository within the 4,667 MTHM allocation for HLW.

Radiotoxicity Method - The radiotoxicity method, uses a comparison of the relative radiotoxicity of defense HLW to that of a standard MTHM of commercial spent nuclear fuel, and is thus considered an extension of the total radioactivity method. Radiotoxicity compares the inventory of specific radionuclides to a regulatory release limit for that radionuclide, and uses these relationships to develop an overall radiotoxicity index. For this equivalence, the standard spent nuclear fuel characteristics are based on pressurized-water reactor fuel with uranium-235 enrichment of 3.11 percent and 39.65 gigawatt-days per MTHM burnup. Using this method, 100 percent of the total inventory of HLW could be disposed of in the repository within the 4,667 MTHM allocation for HLW.

A recent INEEL report (Knecht et al. 1999) promotes the use of either the Total Radioactivity Method or the Radiotoxicity Method rather that the continued use of the Historical Method.

Therefore, under any scenario analyzed in this Idaho HLW & FD EIS, there will be a degree of uncertainty regarding the ability of one or more repositories to dispose of all of the projected canisters of HLW around the DOE complex. Additional uncertainty includes the potential for schedule delays, funding reductions, and technical complexities to license, construct, and operate a national geologic repository. Delays in the availability of disposal capacity for INEEL HLW should be considered as a contingency requiring safe storage at an interim site.

Currently, borosilicate glass is the only approved waste form for HLW destined for a repository. Other HLW forms (e.g., grouted HLW) identified in some of the alternatives would need to be demonstrated equivalent to the vitrified waste form. Without that determination, any HLW form other than vitrified waste would have to be placed into long-term storage. The acceptance of that waste form into the second repository would be uncertain.

6.3.2.5 Cumulative Risk To The Groundwater

In accordance with the Federal Facility Agreement and Consent Order, the existing contamination from releases at INTEC was assessed for risk to human health and the environment, including the Snake River Plain aquifer, as part of Operable Unit 3-13. That assessment only evaluated the hazardous substances (radionuclides and non-radionuclides) that have already been released to the environment. Under CERCLA, remedial action is required to mitigate the risk to acceptable levels if contamination presents an unacceptable risk (greater that 1 in 10,000 chance of developing a tumor) or exceeds the national primary drinking water standards (40 CFR 141) maximum contaminant levels. Currently, there is contamination in the INTEC area (soils and groundwater) that exceeds acceptable risk levels. Any contaminant inven-

tory remaining in the INTEC facilities after they are dispositioned in accordance with applicable requirements will result in the potential for additional contamination to migrate and impact the Snake River Plain aquifer. Cumulative risk evaluated by this EIS includes the risk from both the INTEC facility disposition activities and releases that have already occurred. Therefore, any facility disposition scenario that results in unacceptable cumulative risk would require additional actions to mitigate the risks to acceptable levels. Those additional actions could be additional work (added contaminant removal, stabilization, or other controlling mechanisms) for the facility disposition activity. If these additional actions are not taken under the facility disposition process, the CERCLA remedial action on the Snake River Plain aquifer would be required to implement additional activities to reduce the impacts to acceptable levels. The methodologies used to evaluate the long-term risk from the disposition of HLW facilities are described in Appendix C.9. Section 5.4 presents the cumulative risk of these facility disposition activities and the existing contamination from releases of INTEC being evaluated under CERCLA.

6.3.2.6 RCRA Closure

When hazardous waste management facilities cease operation, they must be closed in a manner that ensures they will not pose a future threat to human health and the environment. RCRA provides two types of closure for hazardous waste management facilities.

Under the first type, known as RCRA clean closure, the facility is decontaminated in accordance with the closure standard. The closure performance standard calls for removal of hazardous wastes and decontamination of all hazardous waste residuals. The action, however, does not address any radiological contamination that may be present. This standard can be achieved in two ways: (1) decontamination of hazardous contaminants to concentrations at background levels or analytical detection limits or (2) decontamination of hazardous contaminants to performance-based concentration limits (i.e., levels at which the hazardous constituents no longer pose a threat to human health or the environment). After the RCRA clean closure is certified to be complete, the facility is no longer subject to RCRA permitting requirements.

The other type of closure, known as closure to landfill standards, imposes no specific residual contamination limits but would require that DOE place an engineered cap over the facility and implement post-closure care. This would include maintenance of the facility, monitoring for releases of hazardous constituents to the environment, and taking corrective action if releases occur. A post-closure permit or alternate enforceable document would be issued covering maintenance, monitoring, and corrective action provisions.

The disposal options evaluated in this EIS include use of RCRA closed INTEC HLW management facilities (Tank Farm, bin sets) as disposal sites for the low-level waste fraction produced under the Separations Alternative. These disposal options assume that the facility undergoes a performance-based closure prior to low-level waste fraction disposal operations. Substantial efforts will be necessary to remove residual contamination from these facilities to reach the performance-based closure standards. Inability to achieve a RCRA clean closure could prevent these INTEC facilities from being used for low-level waste fraction disposal.

6.3.2.7 RCRA/CERCLA Interface

INEEL was placed on the National Priorities List under CERCLA in 1989. In response to this listing, DOE, EPA, and the State of Idaho negotiated a Federal Facility Agreement and Consent Order that describes how DOE will implement CERCLA remedial activities and RCRA corrective action obligations at the INEEL.

INTEC is designated as Waste Area Group 3 in the Federal Facility Agreement and Consent Order. Waste Area Group 3 contains 99 release sites. Many of these release sites are co-located with or surrounding the HLW management facilities considered under this EIS. DOE is currently initiating remedial action for Waste Area Group 3 under the requirements of CERCLA.

Risk management decisions under the facilities disposition alternatives must be integrated with the CERCLA evaluation and decisionmaking for Waste Area Group 3. Decisions on the final end state for the INTEC must consider the cumulative impacts of soil and groundwater contamination influence by the release sites as well as the contributions from the waste processing and facility disposition alternatives.

6.3.2.8 Maximum Achievable Control Technology Standards for Hazardous Waste Combustion

On April 19, 1996, EPA proposed to revise the standards for hazardous waste combustion facilities under joint authority of the Clean Air Act and RCRA (61 FR 17358). EPA revised the proposed emissions standards on May 2, 1997 (62 FR 24212) and finalized this rule on September 30, 1999 (64 FR 52827). Any facility identified in this EIS that would qualify as a hazardous waste combustion unit or similar miscellaneous unit will be required to comply with these new standards. The standards were developed under Clean Air Act provisions concerning the maximum achievable level of control over hazardous air pollutants, taking into consideration the cost of achieving the emission reduction. Those Maximum Achievable Control Technology standards would impose strict limits for dioxins/furans, mercury, semi-volatile and low volatility metals, particulate matter, and hydrochloric acid/chlorine gas from facilities that burn hazardous waste. Standards were also established for carbon monoxide and hydrocarbons to control other toxic organic emissions. Monitoring and recordkeeping would be required to ensure the emission limits are not exceeded. Compliance with the emission standards and associated monitoring requirements must be achieved within 3 years of the effective date (with potential for a 1-year extension). If an existing facility cannot be modified to comply with the standards within that period, it must be shut down until the new emissions controls are in operation. Several alternatives involve upgrades to the New Waste Calcining Facility in anticipation of more stringent air emission standards under this rule.

6.3.2.9 Compliance with Existing Agreements

None of the proposed alternatives would meet all of the commitments under the Idaho Settlement Agreement/Consent Order, the Site Treatment Plan, and the Notice of Noncompliance Consent Order. Table 6-6 lists the compliance status of the proposed alternatives with the enforceable milestones applicable to the INEEL HLW Program.

6.3.3 ADDITIONAL WASTE PROCESSING ALTERNATIVE SPECIFIC ISSUES

6.3.3.1 No Action Alternative

The No Action Alternative results in noncompliance with the final commitments in the Notice of Noncompliance Consent Order and the Idaho Settlement Agreement/Consent Order. Several of the INTEC units, such as the Tank Farm and bin sets, are operating as interim status units. Future RCRA permit requirements are uncertain.

6.3.3.2 Continued Current Operations Alternative

Significant modifications would be required to bring the calciner at the New Waste Calcining Facility into compliance with the Maximum Achievable Control Technology standards for hazardous waste combustion facilities.

This alternative has issues related to delisting and incidental waste as discussed in Sections 6.3.2.1 and 6.3.2.2. In order for the mercury produced as a result of the calcining process to be disposed of as low-level waste, it must be delisted and classified as incidental waste. The alternative also has the issues related to ability of DOE to permit the Tank Farm and bin sets as described in the No Action Alternative.

Table 6-6. Compliance status of the proposed alternatives with the INEEL HLW enforceable milestones.

Milestone	No Action Alternative	Continued Current Operations Alternative	Separations Alternative			Non-Separations Alternative			Minimum INEEL Processing Alternative
			Full Separations Option	Planning Basis Option	Transuranic Separations Option	Hot Isostatic Pressed Waste Option	Direct Cement Waste Option	Early Vitrification Option	
June 30, 2003 – Cease use of pillar and panel tanks in Tank Farm[a]	●[b]	●	●	●	●	●	●	●	●
December 31, 2012 – Cease use of monolithic tanks in Tank Farm[c]	–[d]	–	–	–	–	–	–	–	●
December 31, 2012 – Complete calcination of mixed transuranic waste/SBW[e]	–	–	–	●	–	–	–	–	–
December 31, 2035 –HLW ready for disposal outside of Idaho[f]	–	–	●	●	●	●	●	●	●
December 31, 2035 – All waste ready for disposal outside of Idaho[g]	–	–	●	●	●	●	●	●	●

a. Notice of Noncompliance Consent Order, Section 6.20.B.3.
b. ● indicates that the proposed alternative would satisfy the milestone.
c. Notice of Noncompliance Consent Order, Section 6.20.B.5.
d. Dash indicates that the proposed alternative would not satisfy the milestone.
e. Idaho Settlement Agreement/Consent Order, Section E.5.
f. Idaho Settlement Agreement/Consent Order, Section E.6.
g. "All Waste" means that waste identified in the Idaho Settlement Agreement/Consent Order Sections E.4, E.5, and E6.

6.3.3.3 Separations Alternative

The three options considered in the Separations Alternative are the Full Separations Option, the Planning Basis Option, and the Transuranic Separations Option. The disposal options evaluated in this EIS include use of closed INTEC HLW management facilities (Tank Farm, bin sets) as disposal sites for the low-level waste fraction produced under the Separations Alternative. These disposal options assume that the facilities undergo a performance-based closure prior to low-level waste fraction disposal operations. Substantial efforts will be necessary to remove residual hazardous waste contamination from these facilities to reach the performance-based closure standards. Inability to close in a manner for which RCRA post-closure requirements would not apply could prevent these INTEC facilities from being used for low-level waste fraction disposal.

These options have issues related to delisting, incidental waste, and hazardous waste codes applicable to INEEL's mixed HLW and mixed transuranic waste/SBW as discussed in Sections 6.3.2.1 through 6.3.2.3. The waste streams that must be delisted for the Full Separations and Planning Basis Options include the vitrified HLW, mixed low-level waste Class A type grout, and mercury. In addition to delisting, the mixed low-level waste Class A type grout and the mercury must be classified as incidental waste. The waste streams that must be delisted for the Transuranic Separations Option include the mixed low-level waste Class C type grout and mercury. These same waste streams must also be classified as incidental waste under this option.

6.3.3.4 Non-Separations Alternative

The three options considered in the Non-Separations Alternative are (1) Hot Isostatic Pressed Waste Option, (2) Direct Cement Waste Option, and (3) Early Vitrification Option. For all three of these options there are delisting, incidental waste, and hazardous waste code issues as previously described in Sections 6.3.2.1 through 6.3.2.3.

Hot Isostatic Pressed Waste Option

Two additional concerns associated with this alternative are permitting issues related to New Waste Calcining Facility operations, as identified in the Continued Current Operations Alternative, and a determination of equivalent treatment. The Hot Isostatic Press Facility must be able to demonstrate performance equivalent to the RCRA treatment performance standard of vitrification for HLW. The waste streams that must be delisted for this option include the treated HLW, grout produced from the mixed transuranic newly generated liquid waste, and mercury. In addition to delisting, the mercury must be classified as incidental waste.

Direct Cement Waste Option

Two additional concerns associated with this alternative are permitting issues related to New Waste Calcining Facility operations, as identified in the Continued Current Operations Alternative, and a determination of equivalent treatment. The Direct Cement Facility must be able to demonstrate performance equivalent to the RCRA treatment standard of vitrification for HLW. The waste streams that must be delisted for this option include the treated HLW, grout produced from the mixed transuranic newly generated liquid waste, and mercury. In addition to delisting, the mercury must be classified as incidental waste.

Early Vitrification Option

This alternative does not have any additional issues to those previously identified for all three non-separations alternatives. The waste streams

that must be delisted for this option include the treated HLW, grout produced from the vitrification plant offgas, and mercury. In addition to delisting, the grout and mercury must be classified as incidental waste.

6.3.3.5 Minimum INEEL Processing Alternative

The Minimum INEEL Processing Alternative has delisting, incidental waste, and hazardous waste codes [applicable to INEEL's HLW and mixed transuranic waste/SBW] issues as previously discussed in Sections 6.3.2.1 through 6.3.2.3. The waste streams that must be delisted for this alternative include the vitrified high-level waste fraction, vitrified low-level waste fraction, and grout produced from the mixed transuranic newly generated liquid waste.

6.3.4 ADDITIONAL FACILITY DISPOSITION ALTERNATIVES SPECIFIC ISSUES

Facility disposition activities would be carried out in accordance with DOE requirements for closure of HLW facilities as described in DOE Manual 435.1-1 (DOE 1999a). At closure, the facility must be decontaminated to meet DOE decommissioning requirements or, if the facility cannot meet the decommissioning requirements, closed consistent with applicable disposal site standards. Alternatives that do not result in complete removal of HLW from the INTEC facilities would require that any residual waste satisfy the waste incidental to reprocessing requirements (see Section 6.3.2.2) The applicable disposal site standards would be determined by the characteristics of the residual material (i.e., low-level waste or transuranic waste). DOE may also follow the CERCLA process in accordance with Executive Order 12580 (see Section 6.2.5) to demonstrate compliance with the applicable radioactive waste disposal standards.

DOE is currently developing an incidental waste determination for the tank heels in the INTEC Tank Farm. Decisions whether the tank heels and other residual HLW satisfy the waste incidental to reprocessing criteria are important in determining the applicable standards for evaluating the facility disposition alternatives. For example, if the tank heels were classified as HLW or transuranic waste, DOE would be required to evaluate the performance of the closed Tank Farm against the performance objectives in 40 CFR 191. DOE may seek technical consultation with Nuclear Regulatory Commission regarding its waste incidental to reprocessing determination. The ultimate disposition of the tank heels will be determined through RCRA closure plans for the tanks that must be negotiated with the State of Idaho.

Due to the configuration of many of the buildings and facilities at INTEC, one building may have within its confines several different regulatory or programmatic drivers. For example, a facility might have one area being operated and closed in accordance with RCRA requirements, another area being closed in accordance with CERCLA requirements, and another area to be operated as a permitted unit. This poses a complicated environment for decisionmaking and will require an integrated approach to ensure consistency.